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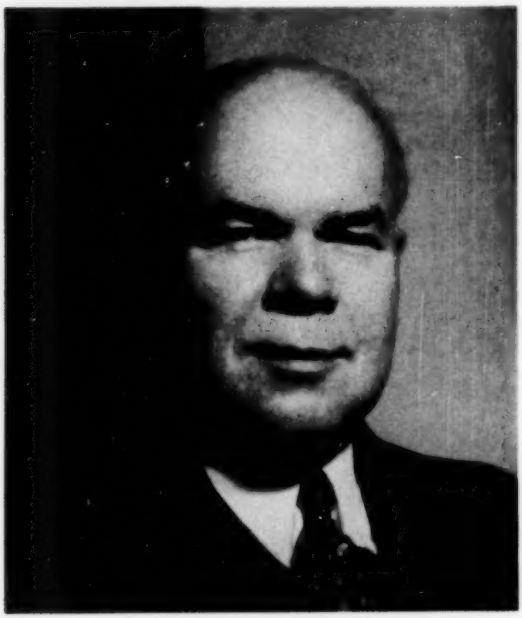

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IN MEMORIAM

EDWIN LEIGH NEWCOMB

For you, Edwin, no dry-as-dust obituary notice! You will be a smiling, singing, memory with us all the days of our lives.

SO long, Edwin! It was nice having you with us, and we are sorry that we cannot have you here in person any more!!

But just as sure as I am that leaves will flutter and fall from the trees around my whitewashed house in Jenkintown, this winter, and just as surely new ones pop out again come spring—so certain, too, am I of the fact that you are now in that blessed elsewhere, quickly making yourself at home as you always did wherever you went—and rejoicing in reunion. Already I know that you have cornered a cloud for your ethereal roses and, although it may not be needed up there, you are going to grow, I know, a garden of your familiar earthbound healing drugs and herbs and simples.

"Basil, Rocket, Valerian, Rue
(Almost singing themselves they run)
Vervain, Dittany, Call me to you
Cowslip, Melilot, Rose of the Sun
Anything green that grew out of the mould
Was an excellent drug for our Fathers of old."

Do you remember how you, young teacher of Botany, and I, your curious pupil (curious in more ways than one) how together we walked the Wissahickon trail, a long forty years ago, mulling and milling in the local mud for aquaphyllic mosses. Then there was that delightful luncheon which we had together at your expense. And what lunchers and munchers we were, for I was the hungry youngster, and you were then as ever, one who knew to choose Falstaffian food and sweep a plate with gusto!

You were always generous—with your money, with your time and with your talents, and you were so easily friendly. You moved around in your many circles, billiken-smiling, bulkily graceful, never at a loss to say something pleasant—and helping, without show, wherever help was needed.

No wonder thousands upon thousands will miss you. There are those young people whose education was made possible by your great Foundation plan to say nothing of those others in Philadelphia and in the middle west, who grew soundly and fair because of your great ministry of teaching. I was one of those fortunate ones.

"You taught me how to watch and pray
And live rejoicing every day."

Someone asked me the day of your funeral, "Was the doctor a religious man?"—and I said to him, "He loved his fellowmen, flowers, trees, birds and butterflies and all else that was the handiwork of God—he did not palpably and publicly parade his belief in eternity—but rather he planted eternity in himself, serene, deep, confident.

Was Edwin Newcomb a man of religion? Well he did not "wrangle over it, write for it, fight for it, die for it—anything but—he *lived* for it!"

And listen, Edwin, how did you so successfully handle successful men, men of great minds and great management, men of will and men of wealth?

How did you jump so easily from class-room to the high councils of a great industry?

How did you do it—so well and stay as you did so long and so acceptably?

Unconventional yourself, you convoked, conducted and concluded great conventions. You walked in the arena and area of big men and big money with as much *sangfroid* and *aplomb* and as honestly as when you pressed the button to register a nickel sale in that little Vineland drug store.

Edwin, you had the things that endure! You had, and knew value.

You were human, cleanly, clearly human—a fine father and husband, a gentle scientist and practical business man as well.

You could count noses, but then you grew roses too. Loyal, deeply, ruggedly loyal, golden was your friendship and unalloyed your friends.

Well, Edwin, the other evening after you had gone away for good, I walked alone in your garden at Montclair. Summer was closing up shop and offering late bargains in roses less sturdy than she had in stock in June.

Your hand and heart were evident all over the place—the dapper vegetable plot, and the giant hemlock where your laughing children and afterwards your grandchildren had delighted you with their antics. I giggled when I saw the dubbalong props you had contrived to keep the limbs from sagging.

Then there was that heap of homely burlap blankets with which you kept your climbing roses warm through winter—and your neighbors cool toward the idea.

Do you recall that you had left an unfinished symphony in destructive distillation, your smelly old pipe, resting and rusting on a turned over flower pot.

But you just couldn't resist, could you, in the middle of the orderliness of your garden, allowing that fugitive clump of golden rod (to you *solidago odora*) to find sanctuary, and that vagrant translucent bush of jewel weed (*impatiens pallida* to you) right in the rose patch! You just had not the heart to pull them away from their earth, had you?

And that was you all over. Well meaning weeds found grace and pardon in your garden. (As you did—and as all who love a garden do.) If your snooty, plant-patented roses, proud and prim and precious didn't like the intrusion—well it was just too bad—too bad!

You were the same in your office—and in your life.

The president of a great drug house was no more, and no less welcome than an eager youngster cuddling in for counsel. You were even gracious to college deans who came testily to your desk—

> "With their cogitative faculties immersed
> In cogibundity of cogitation."

You were always great, because you were always humble.

Well—So long, Edwin! So long!! It was wonderful knowing you.

——and we'll see you again someday—if we are entitled to it!

Ivor Griffith

EDITORIAL

FAIR-DEALISM AND THE A. M. A.

THE current campaign to discredit the American Medical Association on the part of some of our so-called "liberals" is disgusting, to say the least. This same group of "liberals" is making every effort to discredit and impugn the character and motivation of every person who refuses to acquiesce to its social and political dictum.

The medical profession in the United States, since it is composed of human beings, quite understandably has its weaknesses but by and large throughout the years its members have served humanity and served it well. No group on the American scene has earned a higher place in public esteem than has the medical profession. It is somewhat anomalous that this esteem is being challenged by a group of demagogues for whom thinking people can have little feeling other than contempt.

The individual physician occupies a most unique place in the life of his patient. No other human relationship is more intimate unless it be that of marriage. Actually, the patient often confides in his or her physician certain facts which are not even discussed with the marital partner. The physician helps woman in the travail of childbirth, during those tense hours of a child's critical illness and even offers solace in that time of agony when a loved one is lost. Is there indeed any other person outside the family circle in whom one places greater trust and confidence unless it be one's minister, priest or rabbi or He whom these men of God represent?

This public confidence and trust in the medical profession is now being threatened by some of our politicians simply because physicians are opposed to the intrusion of governmental bureaucracy into this intimate relationship. The medical profession is being severely criticized for raising funds from among its members for the purpose of acquainting the public with the reasons for its opposition to compulsory health insurance. The critics of this educational campaign by the A. M. A. suggest that the medical profession wishes to maintain the present *status quo* solely for economic reasons and that no concern is felt for the public welfare.

It is always difficult for one who is falsely accused to present a defense and this difficulty is compounded when the accuser is acting in bad faith and is, furthermore, skilled in both mass psychology and political demagoguery.

The action by the A. M. A. in retaining public relations experts to present its case to the American people is quite like the action of a person who, unskilled at law, retains legal counsel. Possibly it was the wisdom of this step, together with concerted action, which has so infuriated the opposition.

American medicine has a case and a good one. No country in the world has made greater medical progress than has the United States. Not only has life expectancy continued to grow but one ill after another has been conquered by the medical teamwork employed in this country. From the economic standpoint voluntary insurance plans such as Blue Cross and Blue Shield make it possible for the average man to cover most of the large items in the cost of medical care for his family for less than he spends on tobacco and liquor. Free clinics are available in most urban areas for the lowest income groups and few indeed are they who are unable to obtain medical care. The American Medical Association does not take the position that no further improvement can be made. On the contrary, it has proposed a number of steps that should be taken in cooperation with government to accomplish this objective.

Those who advocate compulsory health insurance are victims of that social philosophy which presumes that all man's needs should be provided for and prescribed with no judgment or discernment needed on his part. His role in life should be to simply carry out the orders and directives issued for him by those wise and paternal supermen who man the offices of the central government—a wonderful life indeed!

This philosophy is the fundamental basis of communism whether we label it such or socialism or fair-dealism. The only difference is that in communism the central authority is presumed to be bad since Russia who claims communism is our world-wide competitor. Here it would be different—Americans are kind, warm hearted folk who love and serve all men. Such an error disregards the inescapable fact that all men in all countries are basically alike. Their differences in behavior arise only because it is not always feasible for them to portray their similarities. Americans given the chance to exercise unlimited power would not for long behave better

than Russians or Germans or any other nation's people. Those who believe otherwise are both naive and completely lacking in their understanding of human nature.

The freedom which we enjoy in this country is directly attributable to our exercise of free enterprise and the protection of individual rights. Those who argue that security is possible without the sacrifice of these invaluable assets are guilty of undermining our American heritage. Too many believe that the interests of the state must always be placed before those of the individual. This certainly was not the belief of our founding fathers and the principles which they established have led, in less than two centuries, to the growth of a nation which is the ideal of the free world.

It is the moral duty of all the professions allied with medicine to support it in its fight to prevent the encroachment of government into its prerogatives. Medicine is the bulwark and the base upon which the sister professions of dentistry, pharmacy and nursing depend. If it loses its battle then we shall be forced to capitulate and a brilliant chapter in the history of mankind will be nearing its end.

L. F. Tice

ARE QUATERNARY AMMONIUM COMPOUNDS SPORICIDAL?

By Emil G. Klarmann, Sc. D.* and Eleanor S. Wright, M. A.*

Introduction

IT is rather generally accepted among bacteriologists that the practical problem of killing spores of pathogenic bacteria by means of chemical disinfectants has not been solved to date. While suitable antibacterial agents, employed in adequate concentrations, may be relied upon to destroy the vegetative forms of spore bearing aerobes and anaerobes within a practical period of time, no such claim can be made with respect to the spores themselves. True, a rapid destruction of bacterial spores by chemical means is possible, but the chemicals required are so drastic in action as to be damaging or destructive to the objects from which the removal of the spores is desired. This is why physical means are applied where it is necessary to insure a sporicidal effect. Dry heat and superheated steam are two of the most common methods employed in practice.

There are circumstances, however, in which a sporicidal action is not needed, because of the remoteness of the risk of contamination by spore-bearing microorganisms of the objects to be disinfected. Such objects may be treated satisfactorily with suitable bactericides applied according to tested directions; this process should be demonstrably effective in freeing them from the non-sporulating pathogens (staphylococci, streptococci, pneumococci, tubercle bacilli, etc.) which are potentially capable of causing a local or a generalized infection if permitted to alight upon susceptible host tissue. It is up to the medical practitioner to decide whether or not, in any given case, sporicidal effectiveness should be demanded. In the affirmative case, he must be sure that the antibacterial technique employed will effect complete sterilization, involving the elimination of both the vegetative and the spore forms of any and all pathogens.

* Plaut Research Laboratory, Lehn & Fink Products Corporation, Bloomfield, N. J.

Reference is made to these fundamental premises because, in a recent publication, Lewison (1) advanced the claim that certain quaternary ammonium compounds are satisfactory for the "cold sterilization" of surgical instruments; this claim is based upon a series of experiments carried out with three species of Clostridia, viz., *Cl. welchii, Cl. tetani* and *Cl. sporogenes*. While Lewison does not indicate the degree of sporulation of his cultures of the anaerobes used in his experiments, the presence of spores therein appears to have been established as judged by the following quotation from his paper (p. 877, par. 2, lines 8 to 10): "Most spores are known to be resistant to destruction by antibacterial chemicals. However, the quaternary ammonium agents were highly effective in destroying those spore-bearing organisms tested."

Testing Procedure

Lewison's testing procedure is as follows: *Cl. welchii, Cl. tetani* and *Cl. sporogenes* are grown for seventy-two hours in thioglycollate broth. One-half cc. of each culture is added to five cc. of defibrinated rabbit blood. Small twisted pieces of iron, simulating surgical instruments, are immersed in the blood mixture, then allowed to dry for two hours. The instruments are then immersed in the "sterilizing" solutions for varying lengths of time at 20° C, removed, rinsed in distilled water, placed in tubes of thioglycollate broth and incubated for seven days.

This testing procedure was repeated in our laboratory. In addition, a second set of tests was made, and the "instruments" subcultured into two tubes of thioglycollate broth plus ten percent horse serum (instead of the water rinse and thioglycollate broth). Furthermore, a third set of tests was prepared in which the steel strips were contaminated with one loop of an actively sporulating culture grown on a suitable agar under anaerobic conditions; these strips were dried, exposed to the disinfectant and then subcultured in serum broth (two tubes). No blood was used in the latter test series in order to eliminate any interference with the germicidal action.

Results of Tests with "Cetyl dimethyl ethyl ammonium bromide chloride"

This substance was diluted as directed, viz., one ampule to one liter of distilled water. The results obtained are given in Table I.

TABLE I

ANTIBACTERIAL PERFORMANCE OF "CETYL DIMETHYL ETHYL AMMONIUM BROMIDE CHLORIDE"

Test Organism	Original Lewison Method (Water Rinse, Broth Subculture)			Modified Lewison Method (2 Subcultures of Serum Broth)			1 Loop Dried on a Steel Strip 2 Subcultures of Serum Broth	
	5 min.	10 min.	30 min.	5 min.	10 min.	30 min.	8 hrs.	24 hrs.
Cl. welchii	—	—	—	+	+	±	+	+
Cl. tetani	+	—	—	+	+	±	+	+
Cl. sporogenes	+	—	—	+	+	+	+	+

The seventy-two hour old cultures in thioglycollate broth used in the two Lewison procedures were examined under the microscope for spores. *Cl. sporogenes* was the only one of our cultures in which some spores could be observed. This does not mean that spores were not present in the other cultures which may account for the variation observed in the thirty minute tests with serum broth. Even if Lewison's cultures were actively sporulating it is unlikely that the spores would germinate in the absence of a "neutralizer" in the subculture tube which would suppress the inhibitory action of the quaternary ammonium compound transferred. The difference in the results obtained respectively by the original and the modified Lewison methods clearly shows this.

As has been demonstrated previously by Klarmann and Wright (*2*), serum is capable of acting as a neutralizer of quaternary ammonium compounds; this is the reason why growth was produced in every case in the presence of serum where no growth was observed in its absence. It follows that "cetyl dimethyl ammonium chloride bromide" is not sporicidal, but that it merely inhibits bacterial proliferation. This statement is confirmed by the results of the third method showing that the compound is incapable of sterilizing the spore-bearing test cultures in twenty-four hours.

Results of Tests with Other Quaternary Ammonium Compounds

Additional tests were carried out with other quaternary ammonium compounds using the three Clostridia as test organisms. In this series, ten day old agar cultures were employed which showed

profuse sporulation; they were washed from the agar slants with saline and diluted to match a 100 p. p. m. turbidity standard.

Following is a list of the quaternary ammonium compounds and their dilutions subjected to the test:

Benzalkonium chloride 1:1000 and 1:100
Cetyl pyridinium chloride 1:1000 and 1:100
Benzethonium chloride 1:1000 and 1:100
"Cetyl dimethylethyl ammonium bromide chloride"
One ampul to 1000 cc, and one ampul to 100 cc.

One-half cc of the bacterial suspension was added to five cc of the solution of the quaternary ammonium compound. The "medication" period was 24 hours at 20° C. Subcultures were made into thioglycollate medium, and into thioglycollate medium with ten percent horse serum, respectively, followed by incubation at 37° C. After only twenty-four or forty-eight hours of incubation, all subcultures of the 1:1000 dilutions showed profuse growth indicating that the spores had been but little affected by the quaternary ammonium compounds. The subcultures in which growth first occurred were those containing ten percent serum; thus in this series of tests the presence of serum did not affect the final results, whereas in the tests involving simulated instruments where fewer spores were used, the serum seemed to be necessary to effect recovery and germination of the spores. In the case of the 1:100 dilutions growth occurred more slowly, always in the presence of serum, and occasionally in its absence.

Benzalkonium chloride 1:100 has also been tested against a sporulating culture of *B. anthracis*. The latter survived a twenty-four hour exposure period. Serum broth was necessary for recovery in the subculture.

Supplementary Tests with Micrococcus pyogenes aureus

Although surgical instruments should be cleaned mechanically prior to immersion in a disinfectant solution, Lewison adopted an extremely severe testing procedure involving the use of clotted blood together with a heavy *M. aureus* suspension in the experimental contamination of simulated instruments. His procedure is as follows: Five cc. of a twenty-four hour culture of *M. aureus 209* is added to ten cc. of fresh blood. This mixture is poured over the simulated in-

struments and allowed to clot. The instruments are then placed in the disinfectant solution at 20° C. After definite time intervals, they are washed in sterile salt solution, then dropped into fifteen cc. of broth.

We repeated this procedure, but also carried out a second series of tests employing two tubes of ten percent serum broth (as subculture media) rather than the saline wash and broth. The simulated instruments were handled with a platinum hook so that the clot which had formed was pierced upon being transferred to the broth. The following results were obtained with "cetyl dimethyl ethyl ammonium bromide chloride" (Table 2):

TABLE 2

MICROCOCCUS PYOGENES AUREUS IN THE PRESENCE OF CLOTTED BLOOD—EXPOSURE TIME IN MINUTES

	5	15	60	120
Lewison method, orig.	+	—	—	—
Lewison method, modif.	+	+	+	+

Thus when serum is used in the subculture medium to neutralize the traces of the quaternary ammonium compound transferred no sterilization of *M. aureus* is produced even after two hours of contact.

Discussion

Although numerous papers have been published on the antibacterial action of quaternary ammonium compounds in its various theoretical and practical aspects, it is becoming increasingly evident that much of this work requires revision. The most important reason for this is the failure, on the part of several investigators, to distinguish between the bacteriostatic and bactericidal action of this class of compounds; as a result, they are being credited with an antibacterial potency to which evidently they are not entitled.

The present paper attempts to refute both the expressed and the implied claims as to the sporicidal action of the quaternary ammonium compounds. While this has been done with specific reference to Lewison's recent publication, it must be stressed that his is not the only allegation to this effect. Similar claims have been advanced previously by others, beginning with Domagk (3) who in 1935 stated

that "Zephirol" 1:50 killed anthrax spores in ten minutes. There is every reason to believe that elimination of the adsorbed inhibitory portion of the quaternary ammonium compound by "neutralization" would restore the spores' capacity for germination. Even physical elimination may be effective in this respect as shown recently by the instructive experiments of Kivela, Mallmann and Churchill (4) who achieved a reversal of such inhibition by dilution and agitation of the spore suspension with water or physiological saline.

It is held that in vitro experimentation with cultures of spore bearing bacteria whose spore content is either apparently nil or is being neglected by the experimenter, does not appear to be relevant to any consideration of practical use conditions; in practice, it cannot be predicted whether infection by a spore bearing microorganism is produced by its vegetative form, or by its spore form, or by both.

The use of serum in the subculture to suppress the phenomenon of bacteriostasis (due to the transfer of the adsorbed antibacterial agent) has its practical side because instruments and utensils, presumably sterilized by exposure to antibacterial chemicals, as a rule, come in contact subsequently with physiological fluids (blood, serum, pus, etc.) which will act as antagonists *in vivo*, corresponding to the effect of serum *in vitro*.

It is felt that the problem of producing a practical sporicidal agent has not been solved to date. Although there exist conditions in which it is not deemed necessary to insure a sporicidal effect, there are cases in which positive sporicidal action is demanded; in the latter case only heat sterilization, properly performed, may be relied upon to answer this demand in a practical fashion.

Summary

Quaternary ammonium compounds tested in concentrations up to one percent are not capable of sterilizing the spore-bearing anaerobic organisms, *Cl. welchii, Cl. tetani* and *Cl. sporogenes*. The aerobic spore-bearing *B. anthracis* resists a one percent solution of benzalkonium chloride. Concentrations higher than one percent were not studied.

Where positive sporicidal action is demanded the use of quaternary ammonium compounds should not be relied upon to supply such action.

Failure to suppress the pronounced inhibitory action of quaternary ammonium compounds (by means of suitable "neutralizing" agents) is at the basis of the erroneous claims made for their sporicidal potency in some recent publications.

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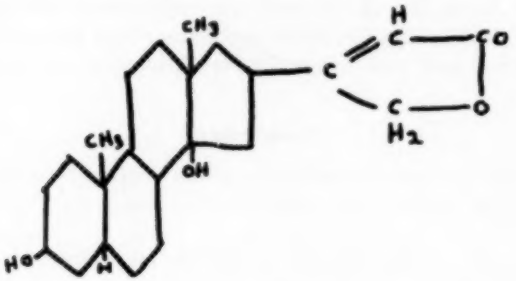
A SPECTROPHOTOMETRIC METHOD FOR THE ASSAY OF DIGITALIS AND ITS PREPARATIONS *

By Robert E. Abrams and Marin S. Dunn**

Introduction

MORE than thirty years have elapsed since Baljet (1) discovered that the active digitalis glycosides will yield a red orange color when treated with alkaline picrate solution. Ever since that time, several attempts have been made to utilize this reaction as a quantitative measure for the assay of digitalis, and its preparations. Knudson and Dresbach (2) first used the reaction and evolved a method using visual colorimetry in comparing unknown digitalis samples to United States Pharmacopoeia Reference Ouabain. Their work was repeated and slightly modified by Swoap (3) who also used Ouabain as a reference. The theory behind the reaction, according to Jacobs (4), is that the color is due to the active hydrogen atom of the unsaturated lactone group upon which structure the cardiac activity also depends.



With the advent of the U. S. P. Reference Standard Digitalis, Bell and Krantz (5) using a modified Knudson-Dresbach method and

* A dissertation presented to the Faculty of the Philadelphia College of Pharmacy and Science in partial fulfilment of the requirements for the Degree of Master of Science in Pharmacy.

** Director of the De rtment of Biology, Philadelphia College of Pharmacy and Science.

a Fisher Electrophotometer equipped with a green filter having a maximum absorption of 525 millimicrons, showed the impracticality of Ouabain as a reference for this method. They obtained more consistent results by using U. S. P. Reference Digitalis as the Standard. However, in subsequent papers, Bell and Krantz (6, 7, 8, 9) and Neumann (10) showed that the digitalis glycosides did not follow the Lambert-Beer Law.

Since, up to the present time none of the various methods of biological standardization have proven ideal, and the proposed chemical assays have been inconsistent, it was felt that an accurate reproducible assay was needed. This need was further emphasized by new information recently brought to light concerning the composition of digitalis. Tamura and co-workers (11) claimed in a comparison of extracts from 23 varieties of digitalis leaves that there was "no parallelism between cardiotonic strength and toxicity." They separated two substances from the digitalis extracts, one having a genuine cardiotonic action with a low toxicity and extreme instability and the other being more toxic and less active. They showed that samples having practically no cardiotonic activity displayed a high toxicity as measured by the cat assay.

With the above facts in mind, experiments were undertaken to see if, by the use of a narrow band spectrophotometer and any modification of the Knudson-Dresbach procedure found necessary, a practical, efficient and easily reproducible chemical assay could be designed.

Experimental

A Coleman Spectrophotometer model number 14 with 19 x 150 mm. rounded cuvettes was used for all readings.

Determination of concentration of the Digitalis Tincture to be used in each test

A series of different concentrations of 10% tinctures of digitalis powder were tested by the method which will be described. It was found that the 5 c.c. portion used by Bell and Krantz (5) was too concentrated and gave spectrophotometric values which did not follow the Lambert-Beer Law when plotted on semi-log paper (Fig. I point marked x). However, the concentration of 2.5 c.c. which was chosen as the standard concentration did follow the Lambert-Beer

Law, as shown by the straight line produced in Figure I, with its closely associated values, and the corroborative readings in Table II.

Determination of the Time Element

A series of readings were taken usually at five minute intervals employing a number of wave lengths. As shown in Figure II the intensity of color increased for about the first thirty to thirty-five minutes, at which time the intensity leveled off or started a gradual decline. However, the difference between thirty minutes and forty minutes was quite insignificant, and thirty minutes was accepted as the time at which the reading should be made after the addition of the alkaline picrate reagent. This differs from the twenty minutes used by Bell and Krantz (5).

FIGURE I

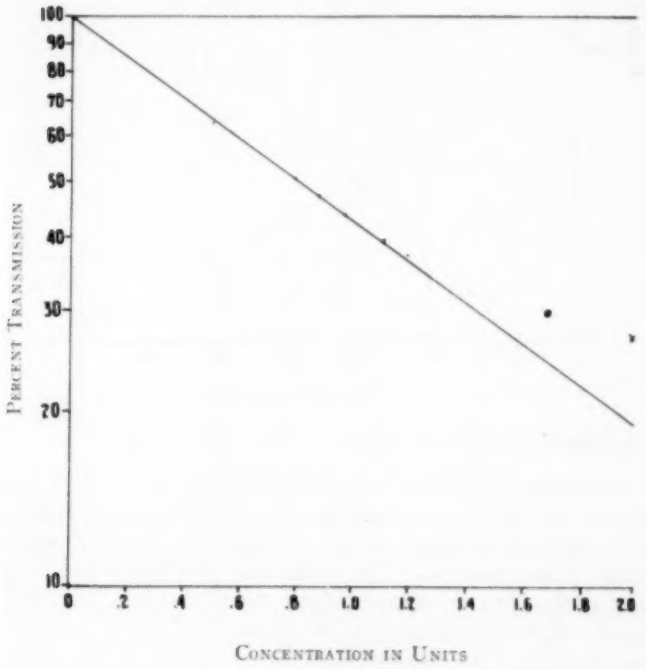
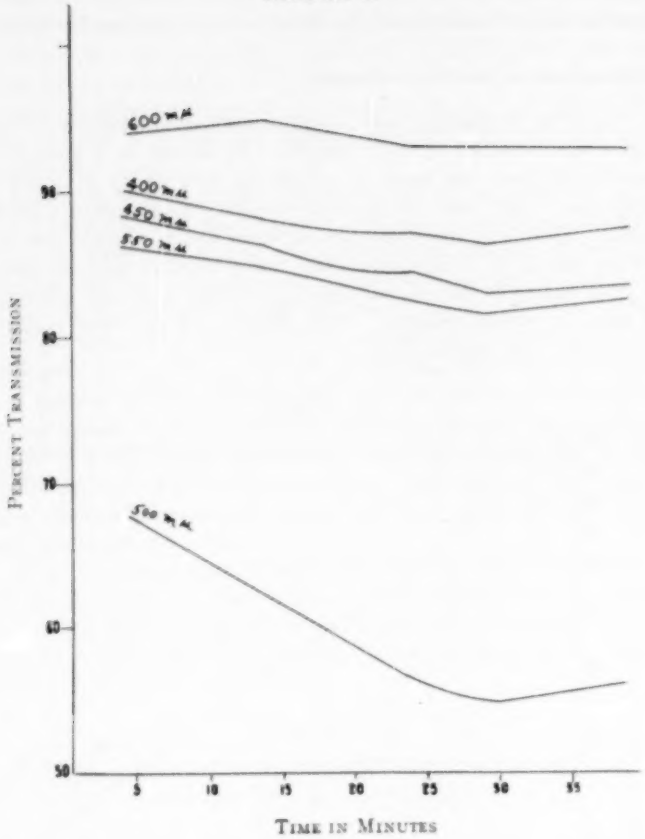


FIGURE II

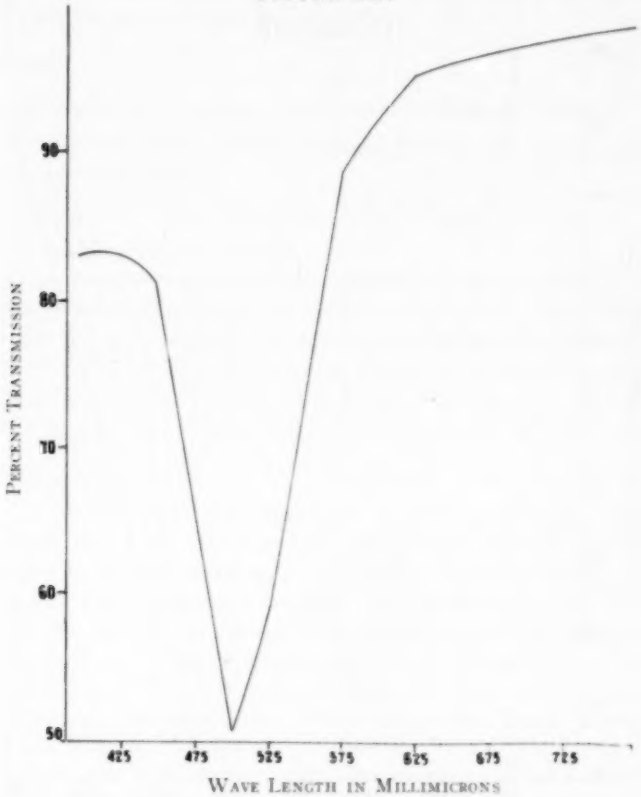


Determination of Wave Length

A number of samples both unknown, and U. S. P. Reference Standard were tested at various wave lengths (Figs. IIIa, IIIb). As the second graph indicates, at 495 millimicrons a point of maximum absorption was reached. This point was quite sharp and was accepted as the point at which readings should be taken. Since it has been shown that the sensitivity of spectrophotometric readings are at a maximum at the point of minimum transmission, this point was

chosen in preference to the 525 wave length used by Bell and Krantz (5) or the 490 wave length used by Neuwald (12). This 495 wave length has also been proposed for digitalis glycosides by Kennedy (13).

FIGURE IIIA

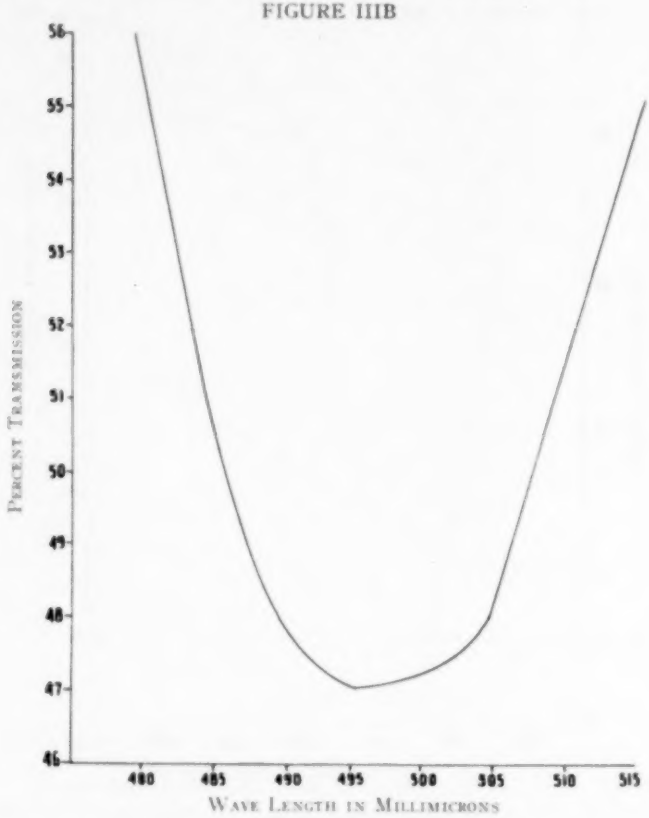


Procedure

A reference tincture was prepared (see U. S. P. XIII) (14) by taking a known weight of Reference Digitalis Powder and adding 10 c.c. of 70 per cent alcohol per gram. This mixture was then shaken in glass stoppered bottles for twenty-four hours. Due to the fact that it was impractical to operate the shaker during the night, the

mixtures were shaken for eight hours at a time on a Kahn shaker for three successive days. Between shakings the bottles containing the mixtures were placed in a refrigerator at 2°C. Goldstein (15) claims that eight hours shaking is sufficient, however, his results could not be confirmed and the twenty-four hour period was used.

FIGURE IIIB



At the end of the shaking period, the mixture was centrifuged at about 2,000 revolutions per minute for two minutes. The liquid was decanted and brought up to volume, then placed in the refrigerator until used. The U. S. P. XIII (14) directs that the mixture should be discarded after thirty days. However, it was found

that there was a slight decrease in intensity of color in that period of time and it was advisable to do the experimental work on the sample as soon as possible after extraction.

The same procedure was followed for the unknown samples except in the case of tablets, where 10 c.c. of the 70 per cent alcohol was used for each ten tablets.

Materials

All materials mentioned below were of Reagent Grade.

1. A 10 per cent solution of neutral lead acetate which must be freshly prepared daily.

2. A 4.7 per cent $NaH_2PO_4 \cdot 7H_2O$ solution.

3. Alkaline picrate solution.

This solution must be freshly prepared, since on standing it will deepen in color. Two stock solutions were prepared. One consisted of a one per cent aqueous picric acid solution and the other a ten per cent sodium hydroxide solution. These were mixed as needed in the proportion of 95 c.c. of picric acid solution to 5 c.c. of sodium hydroxide solution. This mixture is known as the picrate reagent.

Method

2.5 c.c. of a tincture (Reference or unknown) was accurately measured into a 25 c.c. volumetric flask. This amount was then diluted with distilled water to about 15 c.c. To this solution, 2 c.c. of the lead acetate solution was added. The mixture was then diluted to the mark, shaken and filtered. The filtrate was usually light green. When 15-20 c.c. of filtrate had been collected, exactly 12.5 c.c. were transferred to a 25 c.c. volumetric flask and 2 c.c. of the sodium phosphate solution were added. The mixture was again diluted to the mark with distilled water, and shaken. This mixture was then filtered; 12.5 c.c. of filtrate was then transferred to a 25 c.c. volumetric flask and the alkaline picrate solution was added up to the mark. The mixture was shaken and allowed to stand for about twenty-five minutes, at which time a portion of the solution was transferred to a cuvette and a reading was taken exactly thirty minutes after the addition of the alkaline picrate solution. A blank was also prepared at the same time by adding 12.5 c.c. of distilled water to a 25 c.c. volumetric flask and adding alkaline picrate reagent to the mark.

A standard graph was prepared (Fig. I) by treating ten different 2.5 c.c. portions of U. S. P. Reference Digitalis Tincture as described above. In an attempt to eliminate errors in extraction methods, five samples were taken from one extract and five from another. The average value, spectrophotometrically obtained was plotted and a line was drawn from concentration equals zero through this point, and the validity of this line was checked by establishing values for different concentrations as shown by the readings in Table II. It should be noted that readings six and seven (Table II) no longer follow the Lambert-Beer Law. The reading obtained for the 2.5 c.c. portion was arbitrarily assigned the value of one unit and subsequent readings were expressed as multiples of that unit.

Biologically assayed samples were next tested. The samples had all been assayed within six months of the time the readings were taken. Two portions of each sample were weighed and extracted separately. Half of the number of readings were from one portion, and the other half from the other portion. The procedure using 2.5 c.c. was the same as outlined above, and the strengths in units were read from the standard graph and recorded in Table I.

TABLE I

Sample	Number of Readings	Average Readings in Percent Transmission	Standard Deviation	Standard Error of Average	Standard Error of Average as a Percent of That Average	Value From Fig. 1 in Units Per .1 Gm. or Per Tablet	Standard Error of Assay
Reference Powder U. S. P.	10	43.55	1.09	.34	.78%	1	——
A Powder	20	32.6	1.3	.29	.89%	1.35	.0159
B Powder	20	41.7	2.4	.54	1.29%	1.06	.0156
C Powder	10	41.6	1.6	.50	1.20%	1.062	.0151
D Tablet	20	33.67	2.2	.495	1.4%	1.318	.021
E Coated Tablet	20	47.7	1.7	.38	.79%	.89	.0098

Since the intensity of color is in part dependent on the amount of alkali present in the alkaline picrate solution, it is important to measure the volume carefully. It is also advisable to run a portion of the Reference Digitalis Tincture with each new batch of picrate reagent to determine whether the values obtained are situated upon the standard curve. If they are not, correction must be made.

Accuracy of Method

Various known quantities of U. S. P. Reference Tincture were taken as shown in Table II and their strengths were determined by the above procedure. Table II shows the amount of Digitalis Reference Tincture represented, and the amount found in terms of units as explained above, and the percentage deviation.

TABLE II

ACCURACY OF METHOD

Test Number	C.C. of Reference Tincture	Number of Units Represented (Based on Value 1 Unit Equals 2.5cc)	Number of Units Obtained Spectrophotometrically	Deviation From Theoretical Amount in Percent	Readings in Percent Transmission
1	1.25	.5	.52	4%	65
2	2.00	.8	.83	3.7%	50
3	2.20	.88	.88	0.0%	48
4	2.80	1.12	1.12	0.0%	39.5
5	3.00	1.20	1.17	2.5%	38
6	4.00	1.60	1.48	7.5%	29.5
7	5.00	2.00	1.58	21%	27

Discussion

As shown in Table I column 6, the standard error of each average as a per cent of that average falls well below 2 per cent, showing that there is an extremely good reproducibility of readings of individual samples. Column 8 shows the standard error of assay by this method. The significance of this latter value, in Sample A, for example, is that in 95 per cent of assays done on this particular sample, the value will fall within plus or minus two sigma limits.

A sigma limit has the value of one standard error for a particular sample (16). Thus, in sample A in 95 per cent of the cases,

the unit value will fall between 1.32 and 1.38 units. The values given in columns 4, 5, 6, 8 were calculated using methods outlined in the chapter on statistics in the Remington Practice of Pharmacy (16).

The accuracy of the method as shown in Table II tends to stay well within 5 per cent if the last two readings are not taken into account. Since it has been shown that concentration of 4 c.c. and 5 c.c. portions of Reference Tincture do not follow the Lambert-Beer Law, Fig. I, it has been deemed advisable to keep the concentration of the sample within such limits that the readings will fall somewhere between 32 and 65 per cent transmission. Therefore, if the readings of a sample fall above or below these values, it is expedient to adjust the concentration. For example, if the value of an unknown sample should fall much below 32 per cent transmission when employing the suggested amount (2.5 c.c.) 1.25 c.c. of the tincture should be used and final result, in units, doubled; but if the value be above 65 per cent transmission, 5 c.c. of tincture should be employed and the result in units divided by two.

A comparison of biological and spectrophotometric values is recorded in Table III. The biological assay values were given by the laboratories from which the samples were obtained and were not assayed in this study. As may be seen by the table, there is no general correlation between the two values. However, if the work of Tamura and co-workers (11) is correct, then it may be misleading to compare biological assay values with those values obtained chemically.

TABLE III

Sample	Biological Value in Units	Spectrophotometric Value in Units	Percent Deviation From the Biological Value	Source of Sample
A	.9	1.35	50%	LaWall & Harrison
B	1.21	1.06	12%	LaWall & Harrison
C	1.60	1.062	33%	Sharp & Dohme
D	1.12	1.318	16%	LaWall & Harrison
E	.93	.89	4.2%	LaWall & Harrison

Summary

1. As a result of these studies, it has been shown that in order to have a workable spectrophotometric assay of digitalis and its preparations, certain conditions must be rigidly adhered to, namely:

a. The color produced by the Baljet reaction should be read at the conclusion of thirty minutes rather than twenty minutes.

b. A narrow band spectrophotometer should be used, employing a wave length of 495 millimicrons rather than the 525 millimicrons originally proposed.

c. If the concentration of the digitalis glycosides is kept at the level necessary to have the readings fall somewhere between 32 and 65 per cent transmission, the Lambert-Beer Law is followed.

2. The method is accurate to well within 5 per cent, if the suggested conditions proposed in this paper are adhered to, and the reproducibility is also very high; the calculated error being within 2 per cent.

3. It is therefore recommended that a further study be made of the method presented with possible consideration of its eventual adoption as an official assay for digitalis and its preparations.

Acknowledgments

The author extends his thanks to Dr. Eric Martin of LaWall and Harrison Laboratories and to Mr. Daniel Spicer of Sharp and Dohme for the assayed samples of Digitalis used in this study.

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SELECTED ABSTRACTS

Treatment of Peptic Ulcer With a Mucin Combination. Hardt, L. I. and Steigmann, F. *Am. J. Dig. Dis. 3*:195 (1950). The prevention of recurrences in the peptic ulcer patient is being used as an index of therapeutic efficiency of any special management. The immediate relief of symptoms is a valuable property but is much less important than the prevention of recurrences.

A series of 125 patients suffering from gastro-duodenal ulcer (17 gastric and 108 duodenal) were treated with a product combining aluminum hydroxide, magnesium trisilicate and gastric mucin. Diagnosis was based upon a careful history, routine physical examination, and roentgenological studies of the complete gastro-intestinal tract. The case histories ranged from 3 weeks to 40 years with an average of about 8 years. Sixty-four of the patients had previously been on an antacid regimen and 12 had been on diet therapy alone. Twenty of the patients were considered as intractable, not having responded to previous therapy.

Treatment consisted of a bland milk diet with 2 to 4 tablets of the antacid-mucin combination (Mucotin) taken without water 1 hour before meals, 1 hour after meals, at bedtime, and for night pain. Antispasmodics and sedatives were given 3 times a day and at bedtime. The patients were advised against alcoholic beverages, coffee, and smoking. Whenever indicated psychiatric consultation was advised. X-rays were taken before the start of treatment and at various intervals during the therapy. Gastroscopic examination was done only when gastric pathology was suspected.

The majority of the patients were relieved of their symptoms in the first 7 to 10 days of treatment. In general the 20 intractable cases responded as well as the others except at a somewhat slower rate. Surgery was recommended in one of the intractable cases. Of the 89 patients who were under treatment for more than 1 year 53 had complete relief with no recurrences. Failure to obtain complete relief in the remainder was attributed to food allergies, emotional upsets, and poor cooperation. Twenty six of the 28 patients under treatment for nine months to one year had complete relief with no

recurrences. In the 17 patients with gastric ulcer complete healing was observed clinically, roentgenologically and gastroscopically in all cases. The over-all recurrence rate was 15 to 18 per cent in 12 and 24 months observation, respectively.

The authors stated that they were particularly impressed with the results of the mucin-antacid combination in the small group of intractable ulcer patients. In cases where antacids alone had not proven effective the combination brought about a quick response. There also seemed to be a more rapid rate of healing as indicated from the prompt decrease in size of the gastric ulcers. It was suggested that these effects may have been due to the coating effect of the mucin. Although Mucotin also appeared to be more effective in the prevention of recurrences the authors stressed the fact that their observation period covered a range of only 9 to 24 months.

Terramycin Therapy in Pneumonia. Melcher, G. W., Gibson, C. D., Rose, H. M. and Kneeland, Y. *J. A. M. A. 143*:1303 (1950). Terramycin was administered orally in the form of its crystalline hydrochloride in an initial dose of 2 Gm. followed by 1 Gm. every 6 hours. In some cases it was necessary to decrease the amount of antibiotic administered because of gastrointestinal disturbances. Therapy was continued from 4 to 8 days.

Eighteen patients had pneumococcic lobar pneumonia from each of whom was isolated a typed pneumococcus. None of the patients had any complications but several were seriously ill. With the exception of one patient there was a dramatic fall in the temperature within 24 to 36 hours. In many cases there was symptomatic improvement prior to the fall in temperature. The physical signs of pulmonary consolidation rapidly reverted to normal. Follow-up examinations revealed no cases of unresolved pneumonia.

Seven cases of primary atypical (virus) pneumonia were likewise treated with terramycin. A prompt fall in temperature occurred in every patient within 36 hours after the first dose of terramycin and in no case was there a febrile relapse. Clinical improvement was likewise evident within a short time after therapy was started. The paroxysmal cough quickly disappeared as did malaise and headache. Roentgenograms of the chest showed partial or complete clearing prior to discharge from the hospital.

No serious toxic effects attributable to the terramycin were noted but symptoms indicating gastrointestinal irritation appeared in 9 of the 25 patients. The amount of drug administered was decreased in a few cases but in no case was it necessary to discontinue treatment. The side effects observed resembled those resulting from the administration of aureomycin but the authors felt that the former were less severe. The authors also felt that the results in the treatment of atypical pneumonia with terramycin compared favorably with those obtained with aureomycin.

Clinical Trials of Antihistaminic Drugs in the Prevention and Treatment of Common Colds. Report by a special committee of the Medical Research Council. *Brit. Med. J.* No. 4676:425 (1950). A prophylactic experiment was conducted to determine the effectiveness of two potent antihistaminic drugs in the prevention of the development of inoculated colds in volunteers. A 50 mg. tablet of chlorocyclizine hydrochloride, or an indistinguishable dummy containing 16 mg. phenobarbital, was given twice a day beginning 48 hours before the cold inoculation and continuing for 72 hours afterward. Neither the patient nor the examiner knew which one of the pair of volunteers received the antihistamine and which received the dummy. The cold inoculum was a 1 in 3 dilution of an unfiltered washing from a patient who had developed a cold after receiving passage material from a known virus strain. A second group of volunteers received 20 mg. of promethazine hydrochloride or a dummy, twice a day beginning 60 hours before inoculation and continuing for 72 hours afterward.

The incidence of colds was essentially the same in the treated and control groups and there was no clinical difference from the usual course of experimental colds. There were 36 volunteers participating in this study. The only side effect was a low incidence of drowsiness.

A large-scale field trial was carried out at 19 widely distributed centers with a total of 1156 persons completing the course of treatment and the record sheets. Of this number 579 patients received tablets containing 50 mg. thonzylamine and 577 patients received an indistinguishable dummy tablet containing 5 mg. of quinine sulfate. Numbered boxes containing the tablets were made up and recorded at the Council's Research Unit and sent to the 19 centers, so that no

one at the centers knew which were dummies and which tablets contained the antihistamine. The patients were given 3 tablets on each of 3 days and they reported the effectiveness of the treatment at the end of 24 hours, 48 hours, and after one week. Only patients having a typical common cold were admitted to the study.

By combining all of the results irrespective of the duration of the cold before the beginning of treatment 48 per cent of the treated and 42.1 per cent of the controls were found to be improved at the end of the first day's treatment. This slight difference has no real practical significance and by the end of the second day this difference had been practically eliminated when 53 per cent of the treated and 51.3 per cent of the control groups were improved. It was suggested that the slight sedative effect of thonzylamine or the unwitting inclusion of a few individuals who were suffering from hay-fever or an allergic rhinitis may account for the slight difference between the treated and the control groups at the end of the first day of treatment. Thus, in the dosage employed, it would appear that this antihistaminic drug has little if any effect in the treatment of the common cold.

Side effects attributed to the medication including drowsiness, dizziness, headache, and gastro-intestinal symptoms, were reported by 20.9 per cent of the subjects receiving the test drug and by 19.2 per cent of the patients in the control groups. It was suggested that these symptoms were probably symptoms of the cold itself rather than from the drug.

Pregnenolone in the Treatment of Rheumatoid Arthritis. Stock, J. P. P. *Lancet 259*:125 (1950). Typical and well-established rheumatoid arthritis yielded to significant improvement in 1 of 7 patients under treatment with Pregnenolone (17-acetoxy-Δ^5, 20-pregnenone). The hormone was given intramuscularly in an initial dose of 300 mg. followed by 200 mg. a day for 3 weeks. A control period of 2 weeks without therapy was followed by another course of therapy consisting of 200 mg. of Pregnenolone, 1 Gm. of ascorbic acid, and 1000 units of hyaluronidase each day for 2 weeks.

The patient showing improvement received a total of 9 Gm. of the hormone. When injections were started there was a rapid decrease in joint pain and in swelling, and motion was eased. However, pain returned during the 2 week control period but was relieved and improvement was restored during the second course of treatment.

This improvement was maintained by injections of 200 mg. 3 times a week.

One of 2 additional patients with rheumatoid arthritis also exhibited improvement in movement and pain when given a total of 8.2 Gm. of Pregnenolone in daily 200 mg. doses without the interruption of control periods. One additional patient with ankylosing spondylitis on the same treatment schedule but receiving a total of only 3 Gm. also showed improvement. In both of these patients showing improvement the improvement continued after treatment was withdrawn.

Local reactions occurred in 7 of the patients. Red, brawny, indurated swellings, tender to the touch, appeared at the sites of injection 3 weeks after the first course and 1 week after the second course. In one patient the reaction was so severe that the second course was not given.

Single Injections of Chloroquine in Falciparum Malaria. Scott, V. *Am. J. Trop. Med. 30*:503 (1950). Infections caused by *Plasmodium falciparum* were treated with single intravenous doses of Chloroquine hydrochloride in 110 Honduran patients. Many of the patients were acutely ill, including 3 who were in stupor or coma from cerebral malaria. The drug was given in a single dose of 400 mg. diluted with 40 cc. of normal saline solution and administered to a group of 25 patients, none of whom had had malaria during the previous year nor had received suppressive therapy. No additional treatment was given until the patients were discharged and then each patient was given 1.5 Gm. orally. Response to this therapy was prompt and effective. The temperature returned to normal in from 2 to 22 hours and trophozoites disappeared from the peripheral blood in less than 72 hours. During the hospitalization period, ranging up to 32 days, there was no reappearance of the parasites. A number of side effects appeared as a result of this treatment. The systolic blood pressure fell from 2 to 46 mm. without any fall in diastolic pressure or change in pulse rate. The blood pressure usually returned to normal in 10 to 30 minutes but occasionally the effect lasted up to 2 hours. Other effects encountered were dizziness, drowsiness, nausea, and vomiting.

A smaller group of 10 patients were given 400 mg. of the drug undiluted within a period of 3 minutes. These patients evidenced a

similar therapeutic response but the side effects of nausea, vomiting, hazy vision, drowsiness and profuse perspiration were quite pronounced. The systolic and diastolic pressures averaged a fall of 26 and 9 mm., respectively, as compared with average falls of 20 and 0 mm. for the first group.

A third group made up of 75 unselected patients were given 400 mg. of the drug diluted in 500 cc. of normal saline solution by intravenous drip over a period of 1 hour. The therapeutic response in this group was comparable to the response in the first 2 groups but there were practically no side effects. The systolic and diastolic pressure average fall was only 8 and 2 mm., respectively.

BOOK REVIEWS

Industrial Chemistry. By E. R. Riegel. xiii + 1015 pages. Reinhold Publishing Corporation, New York, N. Y. 1949. Price $7.00.

This, the new, fifth edition of a well known book on industrial chemistry, has been welcomed by the many users of the previous editions. It now contains over one thousand pages and gives a comprehensive discussion of over fifty chemical and process industries in as many chapters. Many of these have been re-written or considerably expanded and all have been brought up-to-date. The book is profusely illustrated, contains many tables and flow sheets, all of which add to the clarity of the presentation and contribute to its usefulness.

Riegel's Industrial Chemistry is recommended, without reservation, both as a textbook and as a reference book for all those whose work brings them into contact with the chemical industries.

LOUIS A. REBER

Principles and Practice in Organic Chemistry. By Howard J. Lucas, Professor of Organic Chemistry, The California Institute of Technology, and David Pressman, The Sloan-Kettering Institute for Cancer Research. John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1949. xi + 557 pp. Price $6.00.

This volume is intended to serve as a laboratory manual for students and as a reference for workers in organic chemistry. It meets these diversified requirements and does it well. Following an elementary discussion of reaction rate and equilibrium, there is included information such as bond energies, resonance energies, free energies of formation and molal-reduction potentials. This is followed by a chapter dealing with solubility.

The chapters following are the usual ones found in a laboratory manual in regard to title but much more intensive in regard to content. Thus each chapter includes an excellent discussion as well as

a choice of experiments of the principle involved. There is, furthermore, a chapter for each of the topics usually discussed in elementary organic chemistry. There is included, also, a small section dealing with qualitative organic analysis. The questions at the end of each chapter should also prove useful.

The authors are to be commended for an excellent book which should be useful as a laboratory text for chemistry majors and serve as a reference for advanced students.

N. RUBIN

Organic Syntheses Volume 29. Cliff S. Hamilton, Editor-in-Chief. vi + 119 pp. 15.5 x 23.5 cm. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y., 1949. Price $2.50.

This volume contains tested methods for the preparation of: 1-acetylcyclohexene, acrylic acid, m-aminobenzaldehyde dimethylacetal, 5-amino-2,3-dihydro-1,4-phthalazinedione, β-benzoylacrylic acid, α-bromoheptaldehyde, tert-butylamine, tert-butylamine hydrochloride, Raney nickel, 4-chlorobutyl benzoate, 2-chloromethylthiophene, γ-chloropropyl acetate, 2,6-dichlorophenol, α,α-diphenylacetone, ethyl β-anilinocrotonate, ethyl 2-pyridylacetate, 1-ethynylcyclohexanol, homophthalic acid, homophthalic anhydride, B-(2-hydroxyethlymercapto) propionitrile, indazole, isoprene cyclic sulfone, methacrylamide, m-methoxybenzaldehyde, 1-methylaminoanthraquinone, 1-methylamino-4-bromoanthraquinone, 2-methyl-4-hydroxyquinoline, m-nitrobenzaldehyde dimethylacetal, p-nitrobenzonitrile, 5-nitro-2,3-dihydro-1,4-phthalazinedione, oleyl alcohol, α-phenylcinnamonitrile, protocatatechuic acid, 2-thiophenealdehyde, 1,2,5-trihydroxypentane, and trimethylene oxide.

An insert was included with this volume warning of the danger of recrystallizing benzoyl peroxide from hot chloroform as recommended in Org. Syntheses, Coll. vol. 1,432 (1941). A mixture of methanol and chloroform, at room temperature, [J. Am. Chem. Soc., 68,1686 (1946)] should be used instead.

This volume is written in the style of the previous ones and includes a cumulative subject index covering the material from volumes 20 through 29. This book adds to the value of this series of volumes.

N. RUBIN

The Design of Toxicity Tests. Report on Biological Standards VI. By W. L. M. Perry, Ed.: Med. Research Council of Great Britain Special Report Series No. 270, 1950. 51 pages. H. M. Stationery Office, London.

This report deals with the design of routine tests for toxicity of chemicals. The first part reviews briefly the literature on this matter. The second part describes the method based on quantal ("all or none") response, i.e., only the rate of survival and death has to be observed in the experimental animals. It is shown that the use of large numbers of experimental animals is not sufficient to overcome error because of individual variation. However, the distribution of the logarithm of the sensitivity seems to be equal. The slope of the logarithmic curve may vary, nevertheless, from experiment to experiment, therefore the use of different dosage levels is recommended and evidence is presented of the accuracy of the measurements using different numbers of dosage levels.

The third part deals with the graded response method, based on the measurement of survival time. This method gives more information using fewer animals than the methods based on quantal response.

The report is written in a very clear and logical manner. The mathematical knowledge required of the reader is not above the college level.

The book is a helpful aid for those who are engaged in planning toxicity tests, and in the control of pharmaceutical or nutritional products. We also recommend it for those who teach biometrics, toxicology and biological assay.

J. L. AMBRUS

The General Report of the Pharmaceutical Survey, 1946-49. By Dr. Edward C. Elliot, Director. 240 pages incl. index. American Council on Education, Washington, D. C. 1950. Price $6.00.

Four reports of the work of the Pharmaceutical Survey have already been published. These are: *Findings and Recommendations of the Pharmaceutical Survey, The Prescription Study, The Abilities and Interests of Pharmacy Freshmen* and *Student Personnel Studies.*

This, the General Report, is a compilation of source data, documents and special studies made by or presented to the Committee. Every aspect of American pharmacy was subjected to close scrutiny by the Committee and this collection of data is invaluable for those who wish to avail themselves of the results of this prodigious effort.

The *Findings and Recommendations* previously published are included in this General Report and as a postscript some pertinent data on the implementation phase of the Survey are given.

Since the Pharmaceutical Survey is certain to provide a background for both debate as well as changes in the profession of pharmacy for years to come, this formal report should be in every pharmaceutical library in every area of pharmacy. The Report, too, is worthy of more than a place on the library shelf. It should be read, digested and applied where indicated if the Survey is to have the beneficial effects for which it was undertaken and for which many pharmaceutical leaders and the Director labored for three years.

L. F. TICE

Handbook of Materia Medica, Toxicology and Pharmacology. By Forrest Ramon Davison. Fourth Edition, 730 pages incl. index. The C. V. Mosley Co., St. Louis. 1949. $8.50.

This book is prepared for the student of medicine and the practicing physician. The first four chapters comprising Part I are devoted to: Basic Principles of Pharmacology, Materia Medica, Prescription Writing and Toxicology. Part II treats the various drugs, grouped together from the standpoint of therapeutic use.

Throughout the entire text emphasis is placed on the more practical aspects of the subject rather than the theoretical. Those who expect to find a comprehensive discussion of pharmacology will be disappointed since the pharmacology presented is quite limited. On the other hand practical therapeutics seem to be the author's forte and this material may prove useful to the medical student who, today, is often lacking in practical knowledge.

The references given at the end of each chapter are quite useful and they contribute to the value of the book. On the other hand there is a seeming dearth of illustrations and very little in the way of graphical or tabular material to break up the solid text of rather fine print.

From a cursory examination of the book it would appear that too much reliance has been placed on drugs official in the U. S. P. XIII, without sufficient attention being given to unofficial drugs of great promise. It is, of course, true that a text in this age of speed is obsolete when it is released. This, however, makes it necessary

for an ingenious author to look ahead for future developments. The absence of such topics as chloramphenicol, procaine penicillin, dihydrostreptomycin, para-aminosalicylic acid and other important drugs cannot be explained with a publication date of 1949 and the student will need to supplement this text with other material.

As was stated previously the practical viewpoint given in this book would seem to be its most valuable asset. The student already versed in experimental pharmacology will find it helpful in applying his knowledge in the practice of medicine.

L. F. Tice

Outlines of Food Technology. By Harry W. von Loesecke. Second Edition, 585 pages incl. index. Reinhold Publishing Corp., New York. 1949. Price $7.50.

During the eight years since the publication of the first edition of this book considerable progress has been made in food technology. The author has revised the first edition so as to bring it into agreement with present day practices.

Food Technology embraces the handling of raw materials, processing, equipment, machinery, packaging, preserving, storage and marketing. The author has presented these various aspects of such food products as fruits, vegetables, dairy products, meats, poultry, shellfish, fish, grain fats and oils, sugars, nuts, spices, beverages, jellies, confectioneries and other related fields.

The subject matter is presented in a clear, practical manner so that no extensive knowledge of chemistry or biochemistry is necessary for it to be understood. The various terms used in trade practice are an important part of the text and those who are unfamiliar with such terminology will find these of value.

The author, Dr. von Loesecke, gives every evidence of an intimate working knowledge of food processing throughout the United States.

The book should prove a useful addition to the libraries of those in the food industry as well as to those who wish to gain an insight into certain trade practices as a means of developing new outlets for their own products. Chemists who are primarily trained in the chemistry of foods will find its technological aspects, as presented in this book, both interesting and of value.

L. F. Tice

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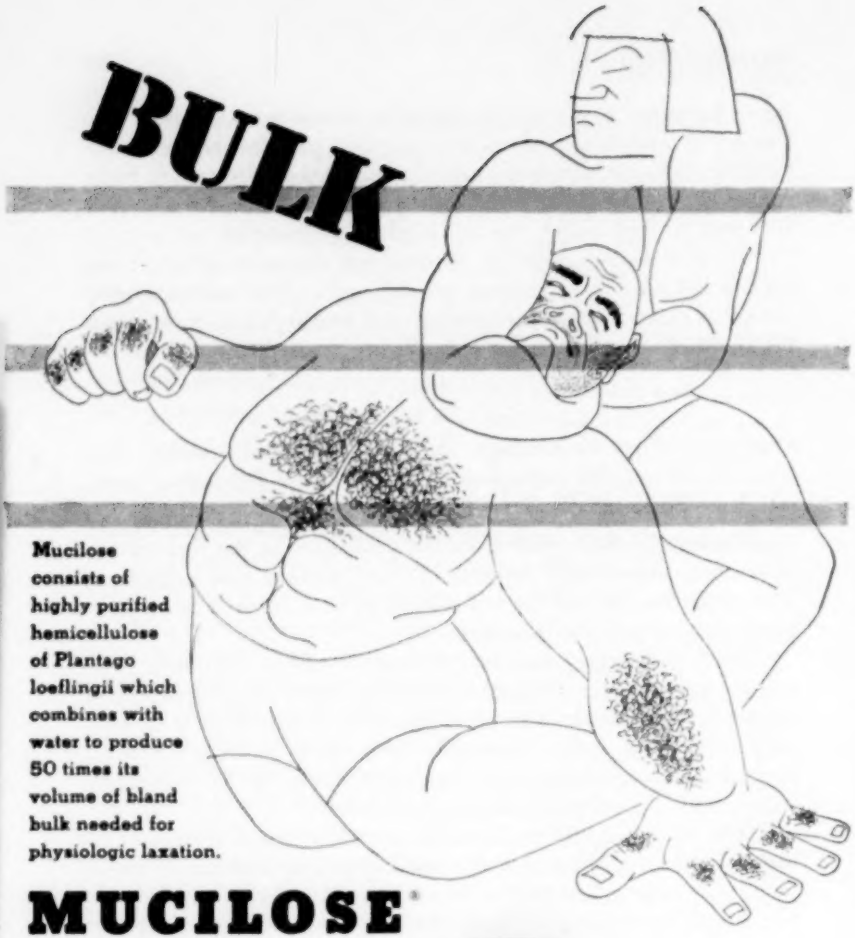

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